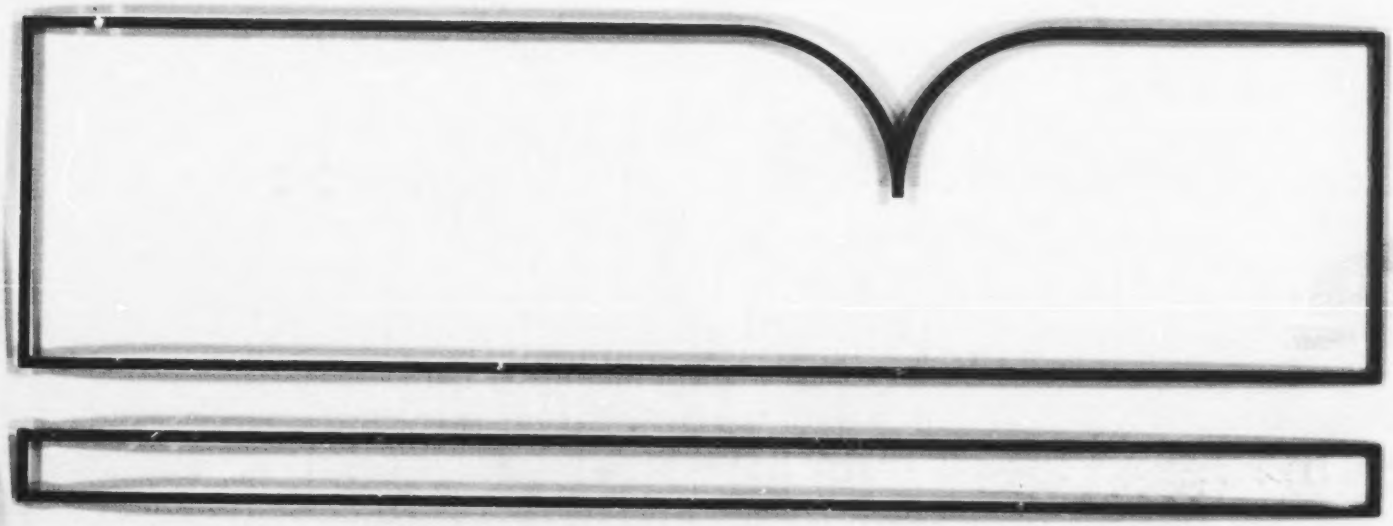
PB89-182463

Superfund Record of Decision (EPA Region 7) Hastings Ground Water Contamination FAR-MAR-CO, NE. Hastings, Nebraska (First Remedial Action), September 1988

(U.S.) Environmental Protection Agency
Washington, DC

30 Sep 88



U.S. Department of Commerce
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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R07-88/017
September 1988

PB89-182463

EPA

Superfund Record of Decision:

Hasting Ground Water/Far-Mar, NE

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The FAR-MAR-CO subsite of the Hastings Ground Water Contamination site is located east of the City of Hastings, Adams County, Nebraska. The subsite is a part of an industrial enterprise zone which contains industrial properties situated along the Burlington-Northern railroad right-of-way. Residential properties are located immediately northwest of the site and agricultural lands are located east of the site. Historical and current use of the area has been for grain storage and railcar loading. The site is currently owned by Farmland Industries, Inc., who acquired the property through a merger with FAR-MAR-CO, Inc. in 1967. The current and previous owners used various chemicals onsite for fumigation of stored grain. Contamination was discovered when complaints about water quality were received by the Nebraska Department of Health (NDOH). Subsequently, the NDOH and the Nebraska Department of Environmental Control began investigating widespread ground water contamination in the Hastings area. Wells that are part of CMS, Inc. public supply system are located east and downgradient of the subsite. Contaminated soil at the subsite are believed to be the result of accidental spills and may be the direct result of a 1959 grain dust explosion which damaged a fumigation tank system, releasing 997 gallons of fumigant. The highest levels of contamination of soil and soil-gas occur within close proximity to the original grain

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Hastings Ground Water (FAR-MAR-CO), NE
First Remedial Action
Contaminated Media: gw, soil
Key Contaminants: carbon tetrachloride, ethylene dibromide

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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EPA/ROD/R07-88/017
tings Ground Water (FAR-MAR-CO), NE
st Remedial Action

16. ABSTRACT (continued)

elevator in relatively small zones. The volume of contaminated soil is estimated to be 33,800 yd^3 yards and is the focus of this ROD. High levels of the contaminants are also found in the ground water beneath the site. The primary contaminants of concern affecting soil and ground water are carbon tetrachloride and ethylene dibromide (EDB).

The selected remedial action for this site includes: in situ soil vapor extraction, utilizing vacuum extraction technologies; treatment of extracted vapor with an activated carbon system, if necessary; access restrictions; and implementation of an O&M program which includes soil, air and ground water monitoring. Results of the ground water monitoring will be used to develop a technical approach for plume management and evaluate the need for ground water treatment in a subsequent ROD. The estimated present worth cost for this remedial action is $2,526,000, which includes a projection of annual O&M costs for the five year operating period. Long-term O&M costs will depend on the success of the vapor extraction during the operating period.

RECORD OF DECISION DECLARATION
INITIAL SOURCE CONTROL OPERABLE UNIT

SITE NAME AND LOCATION

FAR-MAR-CO--
Hastings Ground Water Contamination
Hastings, Nebraska

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the FAR-MAR-CO subsite developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and consistent with the National Oil and Hazardous Substances Pollution Contingency Plan to the extent practicable.

This decision is based upon the contents of the administrative record for the FAR-MAR-CO subsite.

The State of Nebraska concurs on the selected remedy.

DESCRIPTION OF THE REMEDY

This initial source control operable unit was developed to protect public health and the environment by controlling the migration of contaminants present in the soils which overlie the aquifer. Prior to implementation of a full-scale remedy for soil vapor contamination, a pilot-scale test will be undertaken. This pilot-scale test may be done at another subsite. The operable unit is fully consistent with all planned future activities. Future activities will be addressed in subsequent Records of Decision and will include a decision on possible remediation of contaminated ground water.

The major components of the selected remedy are as follows:

- Measures to prevent direct contact to soils contaminated with ethylene dibromide;
- Extraction of volatile contaminants from the silt and sand unsaturated zones;
- Monitoring contaminants in the soils above the aquifer; and
- Monitoring ground water contamination at the site.

DECLARATION

This selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable ~~or~~ relevant and appropriate to the remedial action and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy will mitigate future releases to the ground water; however, this action will not address other contaminant source areas. Due to its limited scope of migration control, this remedy does not address remediation of the ground water. Subsequent actions are planned for the site that will address all remaining concerns.

9-30-88
Date

Signature (RA/AA)

Attachments: Index to Administrative Record
Decision Summary
Responsiveness Summary

RECORD OF DECISION

DECISION SUMMARY

HASTINGS GROUND WATER CONTAMINATION

FAR-MAR-CO SUBSITE

HASTINGS, NEBRASKA

Prepared By:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 1988

Record of Decision

Decision Summary

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DECISION SUMMARY
FAR-MAR-CO SUBSITE
HASTINGS GROUND WATER CONTAMINATION

SITE DESCRIPTION

The FAR-MAR-CO subsite is located east of the City of Hastings, Adams County, Nebraska. Adams County has an estimated population of 30,000 and is in south central Nebraska. The locations of Adams County and Hastings are shown by Figure 1.

The subsite is a part of an industrial enterprise zone which contains industrial properties situated along the Burlington-Northern railroad right-of-way. These properties formerly owned by the Morrison-Quirk Grain Corporation, were used for grain storage. However, one major group of buildings was converted to manufacturing use in 1968. These buildings adjoin the current grain elevator properties on the south and are occupied by Hastings Irrigation Pipe Company. Residential properties are located immediately northwest of the FAR-MAR-CO subsite. Agricultural lands are located east of the site.

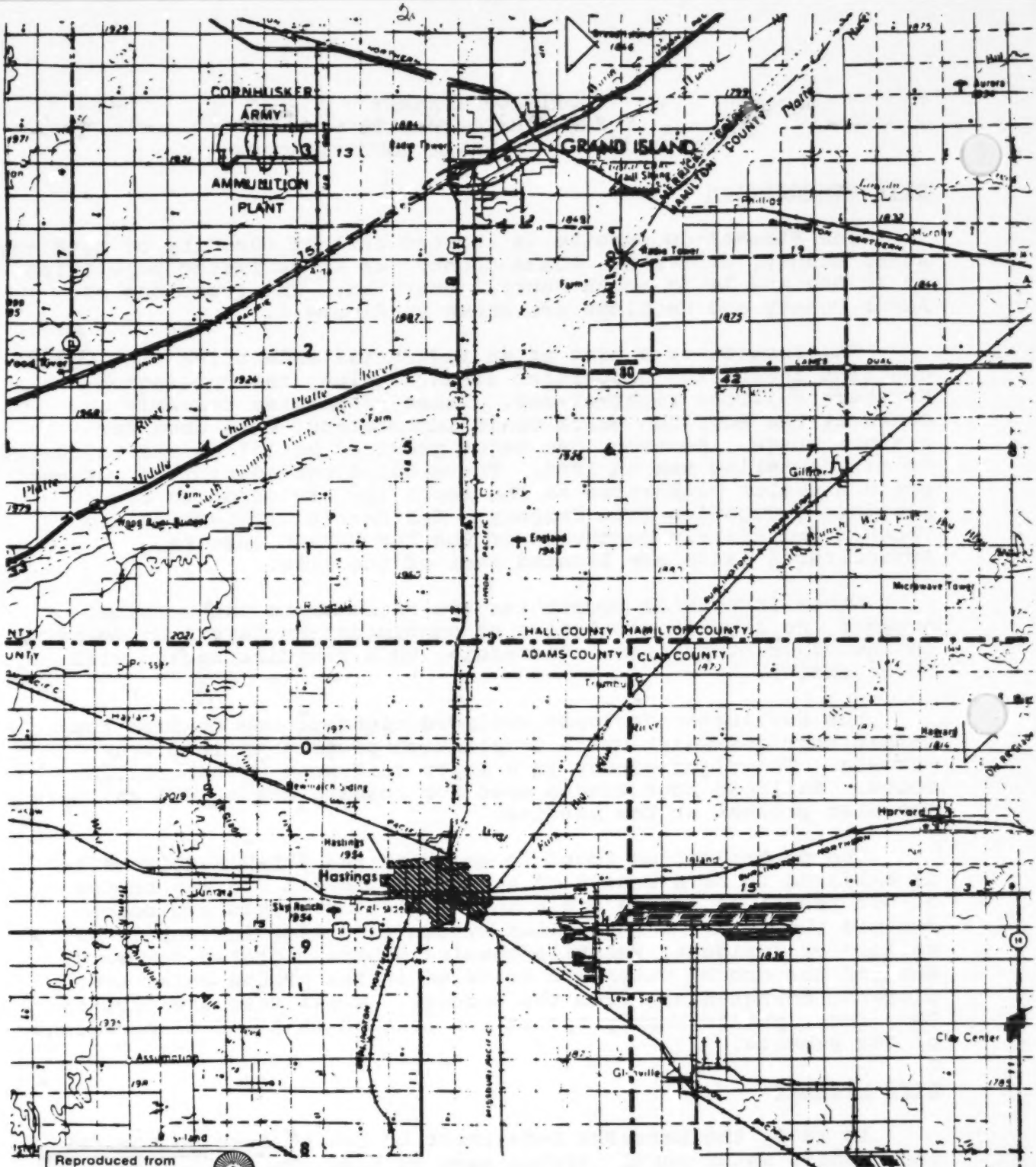
Other industrial properties are adjacent to the subsite; however, no significant levels of contamination have been found on the other properties. Therefore, this remedial action will occur onsite.

The Burlington-Northern railroad right-of-way divides the former Morrison-Quirk Grain Corporation properties into two parcels. The right-of-way is a major east-west transportation route. Railroad spur tracks used for loading grain into railcars are also present at the subsite.

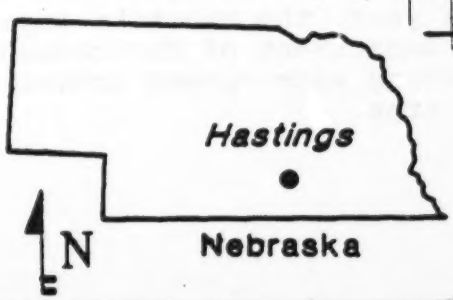
The contamination found in soils at the FAR-MAR-CO subsite is believed to be a result of accidental spills and may be the direct result of a 1959 grain dust explosion. This explosion damaged the tank and fumigation system resulting in loss of 997 gallons of fumigant. Volatile chemicals have migrated downward, entered the ground water and traveled in the ground water some distance downgradient from the subsite. Wells that are part of CMS, Inc., public supply system are located east and downgradient of the subsite.

SITE HISTORY

In 1983, the Nebraska Department of Health sampled the CMS, Inc. public water supply system east of Hastings in response to citizen complaints of taste and color in the drinking water. That same year, the Nebraska Department of Health (NDOH) and the Nebraska Department of Environmental Control (NDEC) began investigating wide-spread ground water contamination in the Hastings area.



Site Location Map
HASTINGS, NEBRASKA



0 5 Miles

Scale

Figure 1

During this investigation, samples collected from the CMS Well 24 indicated that the well was contaminated with several compounds, primarily chlorinated solvents, including carbon tetrachloride (CCl_4 and low levels of trichloroethene (TCE). CMS Well 24 is located approximately one mile east of the FAR-MAR-CO subsite. According to field investigations conducted by EPA, CMS Well 24 is hydrologically downgradient from the subsite.

In 1984, the State of Nebraska collected additional samples from CMS, Inc. supply wells and from private wells in the area. In late 1984, EPA laboratories confirmed findings by the State of Nebraska Laboratory that ethylene dibromide (EDB) was also present in samples taken from CMS Well 24.

In an effort to define the extent of contamination in Hastings, Nebraska, EPA began sampling wells in 1985. Field investigations, which included soil-gas sampling, soil sampling and the installation of one monitoring well were conducted in 1986 to identify and characterize suspected sources of contamination in the Hastings area.

As a result of the analysis of data collected in 1985 and 1986, EPA identified this subsite as the area from which CCl_4 and EDB found in CMS Well 24 emanated.

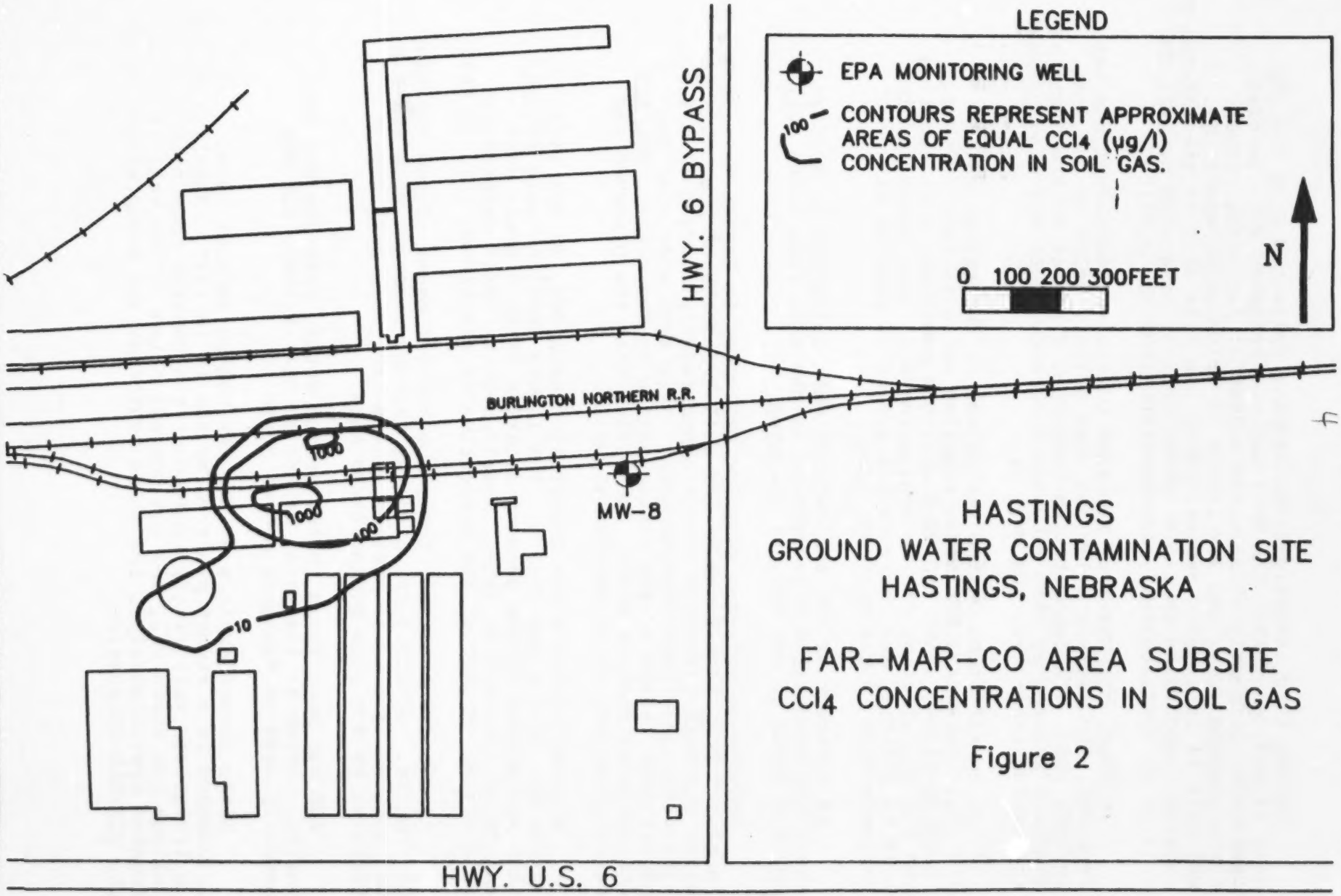
Results of soil-gas sampling are shown in Figure 2. High levels of CCl_4 were found in the soil-gas north of the original grain elevator structure within approximately 10 feet of a large liquid fumigant bulk storage tank. This same area also has significant levels of EDB contamination in the soils. The EDB contaminated zone is small, indicating that its presence was probably caused by an accidental spill.

Morrison-Quirk Grain Corporation used CCl_4 at the site during the 1950's and 1960's. The liquid fumigant bulk storage tank was placed at the present location after a grain dust explosion occurred in 1959. Morrison-Quirk Grain Corporation sold the major part of the properties to FAR-MAR-CO Inc. in 1975.

Farmland Industries, Inc., the current owner of the FAR-MAR-CO subsite, acquired the property through a merger with FAR-MAR-CO, Inc. in 1976. The present owners have used CCl_4 (80-20 mixture) to fumigate grain at the site.

EDB has been found in the ground water, soil-gas and soil onsite. Prior to its being banned by EPA in 1983, EDB was commonly used to fumigate stored grain.

EPA's investigations at the FAR-MAR-CO subsite were documented in a report prepared by REM II in 1987. Sampling of an irrigation well (I-46) located at the Central Community College has shown CCl_4 and EDB contamination. This well is located approximately 1 1/2 miles southeast and downgradient of the FAR-MAR-CO subsite.



HASTINGS
GROUND WATER CONTAMINATION SITE
HASTINGS, NEBRASKA

FAR-MAR-CO AREA SUBSITE
CCl_4 CONCENTRATIONS IN SOIL GAS

Figure 2

EPA conducted soil sampling and soil-gas sampling in 1987 and 1988 to better define the extent of contamination at the subsite and to refine preliminary design data for the source control remedy.

An Engineering Evaluations and Cost Analysis (EE/CA) was released by EPA for public comment on February 3, 1988. The original public comment period for this subsite was extended until April 30, 1988. EPA has prepared a responsiveness summary which addresses the comments received.

EPA has no information indicating generation of hazardous substances resulting from grain storage operations at the site. Therefore, no onsite burial of wastes is suspected.

Public access to the subsite is not restricted at this time; however, the owner of the subsite has been advised by EPA that precautions should be taken during maintenance activities which could disturb the contaminated soils.

ENFORCEMENT HISTORY

In September 1985, general notice letters were issued to potentially responsible parties (PRPs) connected with the Hastings Ground Water Contamination NPL site. The first PRP meeting was held in October 1985 at which time the PRPs were asked to perform the needed RI/FS studies. No proposals to undertake the RI/FS were made by the PRPs.

In December 1986, EPA notified Farmland Industries, Inc. and Morrison-Quirk Grain Corporation of their potential liability at the FAR-MAR-CO subsite. In January 1987, a PRP meeting was held to review EPA's findings to date. Farmland Industries and Morrison-Quirk Grain Corporation were asked to undertake the next phase of investigations. Neither party made an offer. During meetings held with the PRPs in 1987, EPA requested that the needed removal actions be done by the PRPs. EPA issued special notice letters on November 5, 1987 to Farmland Industries and Morrison-Quirk Grain Corporation. The PRPs subsequently received draft administrative orders on consent in March 1988 which included source control and ground water remediation. The PRPs responded to EPA on April 13, 1988, with an offer to participate in a pilot study of soil vapor extraction.

On June 8, June 28 and July 22, 1988, EPA met with PRPs to discuss pilot scale testing for source control.

COMMUNITY RELATIONS

Community relations activities for the Hastings Ground Water Contamination site were initiated by the EPA in 1984 with the development of a Community Relations Plan. Since December 1984, EPA has conducted meetings periodically with Hastings city officials to update them regarding site work and findings.

A public meeting was held in November 1985 to present site information and plans for the RI/FS. In February 1987, the Report of Investigation for the FAR-MAR-CO subsite was placed in the public information repository and was mailed to all interested parties.

EPA Region VII Public Affairs Office has mailed Fact Sheets periodically to parties who have expressed an interest in the Hastings Ground Water Contamination site. This office also responds to inquiries regarding this site made by news media and members of the public.

An Engineering Evaluation/Cost Analysis was released for public comment in February 1988. This document set forth EPA's proposed cleanup plans for the FAR-MAR-CO subsite.

A public meeting was held on March 5, 1988, to discuss EPA's findings and the need for site cleanup. Concerns regarding the environmental impacts of contamination and the cost of cleanup were voiced.

Several issues were raised by residents during the course of the remedial investigation, as well as at the most recent public meeting. A responsiveness summary, which addresses the comments and questions raised, is attached to this ROD.

SITE CHARACTERISTICS

Investigations conducted by EPA during 1985 and 1986 are documented by Report of Investigations, Hastings Ground Water Contamination, FAR-MAR-CO Subsite, dated February 24, 1987. Data presented by this report show that the highest levels of CCl_4 contamination in the soils and soil-gas occur in the area defined by the soil-gas contours illustrated in Figure 2.

Data presented in this report also show high levels of CCl_4 in ground water at the subsite. EPA has published a maximum contaminant level (MCL) of 5 ppb for CCl_4. Significant levels of EDB contamination are also present in monitoring well MW-8 at the subsite and in downgradient water supply wells. The above-referenced report also contains an assessment of potential risks to human health from the contaminated ground water.

The amount of CCl_4 and EDB contamination present in the ground water and in soils above the water table necessitate some response action at the FAR-MAR-CO subsite to reduce the potential carcinogenic risks to human health.

The analytical results from the subsite investigation and the risk assessment can be found in the referenced report for the FAR-MAR-CO subsite. A brief summary of the results is presented below.

Ground Water Contamination

Ground water at the subsite is found at a depth of approximately 120 feet. The subsite is underlain by a sand and gravel aquifer, having a saturated zone approximately 100 feet deep. This aquifer is the sole source of drinking water and is used extensively for industrial and irrigation purposes. The lateral flow in the aquifer was found to be generally eastward from the subsite. However, the potentiometric surface map of the area indicates the direction of flow east of the subsite is influenced by the regional east-southeast gradient.

Ground water samples were collected from the monitoring well located at the subsite and from monitoring wells located upgradient from the subsite. The highest detected contaminant concentrations were seen at well MW-8 as shown in Table 1-1. Contamination with CCl_4 and EDB is seen in the shallow portion of the aquifer (120-140ft.) at the subsite. Private irrigation wells located 2,000 - 6,000 feet downgradient from the subsite have shown CCl_4 and EDB contamination. One domestic well (D-8) is also contaminated with EDB. The sand and gravel aquifer is underlain by thick deposits of clay and shale. Depths to the clay/shale formations range from 200-220 feet. Historical water quality data for municipal water supply well CMS 24 and private wells are given in Tables 1-2 and 1-3.

Soil Contamination

Soil sampling and soil-gas sampling were performed in 1986. This sampling shows high levels of contamination in the soil-gas. Analytical data from the soils show localized areas of contamination. Figure 3 shows the proposed response area where the highest levels of CCl_4 in soil-gas have been detected. Soil-gas sampling was conducted in 1987-88 in order to better define zones with the highest concentration of volatiles in the soils. The remedy selected in this document will mitigate future releases to the ground water by removing the high levels of CCl_4 and EDB from the unsaturated zone above the ground water.*\

As shown in Table 2, there is a significant threat to public health for the EDB-contaminated zone. This increased risk could occur as a result of direct contact with the EDB-contaminated soils. The Total Incremental Lifetime Cancer Risk of 9×10^{-4} corresponds to nine cancers in a population of 10,000. The CCl_4 and PCE found in soils at the subsite do not contribute to this risk estimate for direct contact.

*\ Subsequent to publication of the EE/CA, data became available to EPA, which indicated high levels of CCl_4 and EDB in the sand materials underlying the silt. This information was discussed at the public meeting on March 5, 1988, and reviewed with the PRPs at a meeting on April 13, 1988.

Table 1-1

Range of Concentrations of Volatile Organic Compounds in Ground Water East of Hastings, Nebraska, 1985 - 1987.

Concentrations (ug/l)

Paramaters	OW-2s	OW-2d	MW-8
Trichloroethylene	ND - 13	ND - 92	ND - 21
Tetrachloroethylene	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND
Trans-1,2-Dichloroethene	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND
Carbon Tetrachloride	ND	ND	570 - 1300
Ethylene Dibromide	ND	ND	ND - 8

Notes

- Data were obtained from the REM II Ground Water Investigation Report for Hastings Ground Water Contamination, May 7, 1987, the REM II Report of Investigation for Colorado Avenue Subsite, February 24, 1987, and quarterly ground water sampling data for April 1987.
- OW-2s and OW-2d are located upgradient of the FAR-MAR-CO subsite.
- MW-8 is located at the FAR-MAR-CO subsite.
- Key:
  - ND - not detected
  - s - shallow well (120-140 feet)
  - d - deep well (approximately 170-180 feet)

Table 1-2

Range of Concentrations of Volatile Organic Compounds in Ground Water East of Hastings, Nebraska, 1983 - 1984

Concentrations (ug/l)

Paramaters	I-49	D-8	CMS-24	I-46
Trichloroethylene (TCE)	NS	607 - 764	2.3 - 2.4	NS
Tetrachloroethylene (PCE)	NS	ND - 3.8	ND	NS
1,1 Dichloroethene	NS	ND	ND	NS
Trans-1,2-Dichloroethene	NS	4 - 15	ND	NS
1,1,1 Trichloroethane (TCA)	NS	ND	ND	NS
Carbon Tetrachloride	NS	ND	20 - 22.6	NS
Ethylene Dibromide	NS	NS	*	NS

Notes

- 1983 and 1984 analyses were reported by State of Nebraska
- Data were obtained from the State of Nebraska, Department of Health for 1983.
- No 1984 data found for D-8 and CMS-24 wells.
- Key:
  - NS - well not sampled by State
  - ND - not detected
  - * - Sampling of the CMS, Inc., distribution system by NDOH in 1984 revealed EDB contamination in the range of 0.62 - 1.7 ug/l. CMS well 24 was the only supply well in use at that time.

Table 1-3

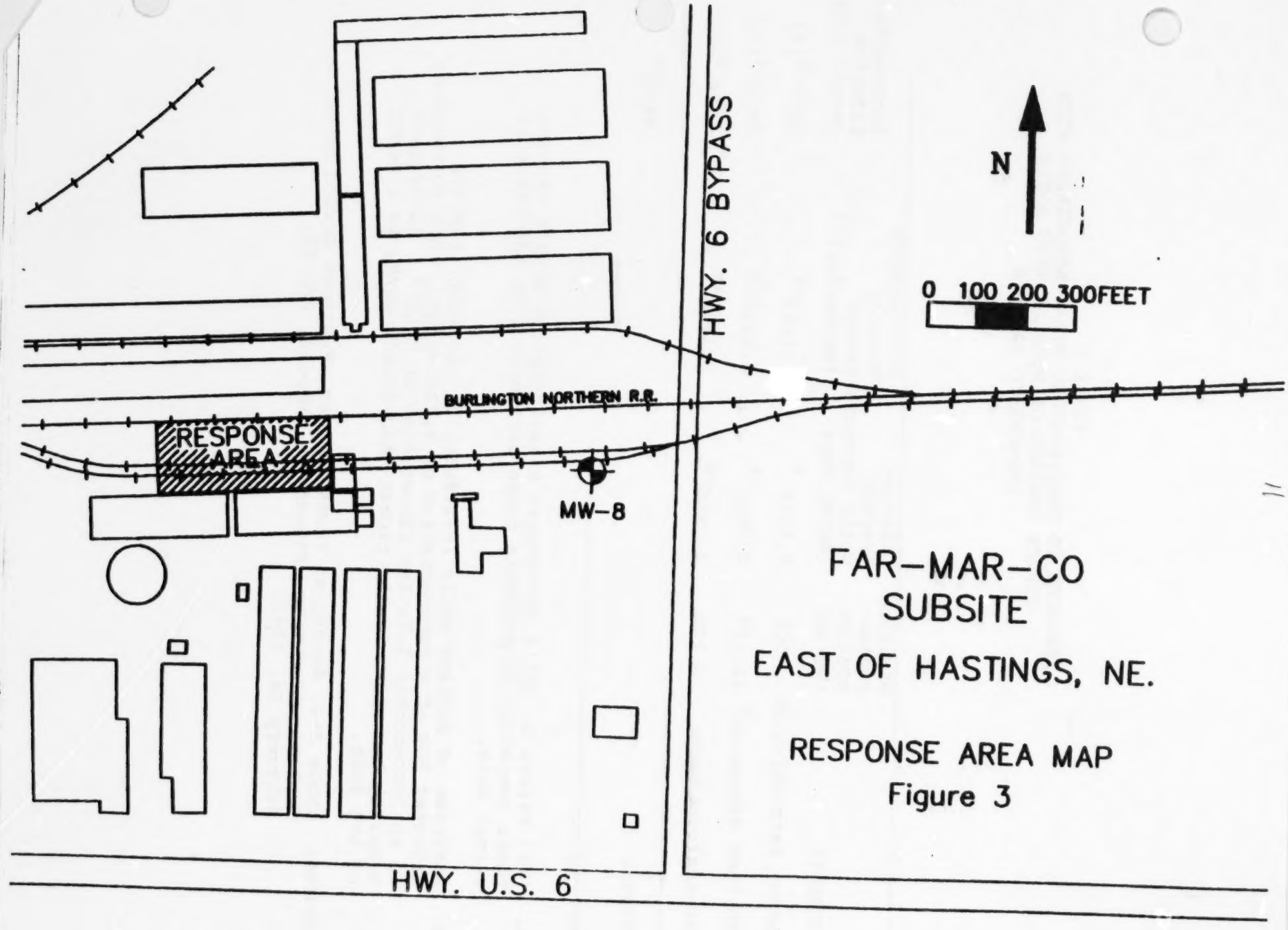
Range of Concentrations of Volatile Organic Compounds in Ground Water East of Hastings, Nebraska, 1985 - 1987.

Concentrations (ug/l)

Paramaters	I-49	D-8	CMS-24	I-46
Trichloroethylene (TCE)	45.0 - 69	182 - 1200	ND - 7	42 - 180J
Tetrachloroethylene (PCE)	ND - 1.8	ND - 6.3	ND	ND - 2J
1,1 Dichloroethene	1.0 - 5(J)	ND - 1.5	ND - .1	ND
Trans-1,2-Dichloroethene	ND	ND	ND	ND
1,1,1 Trichloroethane (TCA)	ND - 7(J)	ND - 8	ND - .5	ND
Carbon Tetrachloride	25 - 45	ND - 4.4	1 - 22	ND - 4..
Ethylene Dibromide	3.2 - 6.8	ND - .5	ND - .32	ND - .04J

Notes

- Ground water data presented here are for purposes of problem definition. Well owners have been advised that water is not suitable for drinking.
- Data were obtained from the REM II Ground Water Investigation Report, Hastings Ground Water Contamination, May 7, 1987, and quarterly ground water sampling conducted in July 1987.
- Above analyses were reported by EPA Labs and EPA Contract Labs
- Key:
  - ND - not detected
  - J - Compound was qualitatively identified; but failed to meet all quality assurance criteria and therefore is only an estimated value.



FAR-MAR-CO
SUBSITE

EAST OF HASTINGS, NE.

RESPONSE AREA MAP
Figure 3

TABLE 2
EXPOSURE TO CARCINOGENIC RISKS ASSOCIATED WITH
DIRECT CONTACT OF WORKERS WITH SOILS
FAR-MAR-CO SUBSITE

Chemical	Maximum Concentration (ug/kg)	Lifetime Average Daily Exposure (mg/kg/day)	Carcinogenic Potency Factor $(mg/kg/day)^{-1}$	Incremental Lifetime Cancer Risk[a]
Carbon tetrachloride	390	3.6×10^{-7}	1.3×10^{-1}	5×10^{-8} [B]
Ethylene dibromide[b]	12,400	2.3×10^{-5}	4.1×10^{-1}	9×10^{-4} [B]
Tetrachloroethene	1,200	1.1×10^{-6}	5.1×10^{-2}	6×10^{-8} [B]
Overall				9×10^{-4}

a. [B2] refers to EPA's carcinogen classification scheme ranking these compounds as probable human carcinogens on the basis of animal data.

b. Analyses of surface soils (0-2 feet) at the same location detected EDB at a concentration of 9,420 ug/kg. This corresponds to an Incremental Lifetime Cancer Risk of 7×10^{-4}. Subsequent sampling has shown levels higher than 12,400 ug/kg at a depth of 1-3 feet.

Source: Table 3-4, Report of Investigation, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, REM II, February 24, 1987.

The carcinogenic risks are theoretical quantifications and are reported as excess lifetime cancer risks. Excess lifetime cancer risk is defined as the incremental increase in the probability of getting cancer compared to the probability if no exposure occurred. For example, a $1x10^{-6}$ excess lifetime cancer risk represents an exposure that could result in one extra cancer case per million people exposed.

RISK ASSESSMENT

The primary potential human health impacts at the FAR-MAR-CO subsite are the exposure of residents to contaminated ground water and exposure of workers to contaminated soils. In order to evaluate this public health impact, a risk assessment, which evaluates risks as a result of the exposure, was conducted. The risk assessment addressed the health effects associated with ingestion of contaminated ground water and incidental direct contact to the contaminated soils. This assessment provides a quantitative estimate of risk levels under existing conditions, that is, an estimate of risk levels in the absence of remedial action. This serves as a baseline against which the need for remedial action is evaluated. The risk assessment included calculations of the human dosage for contaminants in ground water.

Potential exposure pathways to humans from the use of contaminated ground water include:

Ingestion of ground water
Inhalation of volatile chemicals released during water use
Direct dermal contact with contaminated water

Persons potentially at risk of exposure to the contaminants in ground water include users of private and industrial wells downgradient from the subsite and customers who depend on the CMS, Inc. public water supply east of Hastings. This includes all employees at the Hastings East Industrial Park, all residents of the U.S. Air Force housing located at the Hastings East Industrial Park and all employees and students at the Hastings Central Community College Campus. Future users of the ground water would include communities located east of Hastings.

To characterize risk at a site, indicator chemicals are first identified. Factors considered in identifying these chemicals include: maximum concentrations of contaminants at the subsite and their comparison to standards, presence of contaminants in ground water samples collected downgradient from the subsite, and carcinogenicity of contaminants. These chemicals were ultimately selected and are listed in Table 2 and Table 3. EDB and CCl_4 are considered the main contaminants of concern based on the above factors. Both are highly persistent in the environment and are no longer used for grain fumigation. EDB and CCl_4 are classified as probable human carcinogens.

TABLE 3
CHRONIC DAILY INTAKE OF CARCINOGENIC CONTAMINANTS PRESENT IN GROUND WATER AND CALCULATION OF INCREMENTAL LIFETIME CANCER RISK

FAR-MAR-CO SUBSITE

Chemical	Maximum Concentration (ug/kg)	Lifetime Average Daily Exposure (mg/kg/day)	Carcinogenic Potency Factor $(mg/kg/day)^{-1}$	Incremental Lifetime Cancer Risk[c]
Carbon tetrachloride	1200	3.4×10^{-2}	1.3×10^{-1}	4×10^{-3} [B]
Ethylene dibromide	6.8	1.9×10^{-4}	41	8×10^{-3} [B]
Overall				1×10^{-2}

a. [B2] refers to EPA's carcinogen classification scheme ranking these compounds as probable human carcinogens on the basis of animal data.

NOTE: Calculations were made utilizing the highest contaminant concentrations observed (well MW-8) based on available data in 1986. More recent ground water sampling of well MW-8 at the subsite has shown higher levels present for both contaminants.

Source: Table 3-8, Report of Investigation, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, REM II, February 24, 1987.

The potential human health impact of the remedy has been investigated. Calculations based on air dispersion modeling and estimates of emissions have been presented in the EE/CA. The results of these calculations show the need for air monitoring during cleanup actions. As explained in the EE/CA, air emissions controls will be used if needed. The Agency will request an opinion from the Agency for Toxic Substances and Disease Registry (ATSDR) regarding proposed ambient air emission levels.

Because the incremental cancer risk associated with direct contact to EDB-contaminated soils approximates one in one thousand, it was determined that the surficial soils do pose an imminent health threat to the workers at the subsite.

SCOPE OF OPERABLE UNIT

This response action is an initial source control operable unit and is consistent with Section 300.68(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This initial source control operable unit is being implemented to protect public health and the environment by controlling the migration of contaminants from the soils to the ground water. The operable unit addresses known areas of contamination in the sands and silts which overlie the aquifer. The migration of contaminants from the soils into the aquifer is one of the major concerns posed by the site. This operable unit was initiated to deal with these concerns and is further described in the EE/CA document which was released for public comment.

The operable unit is fully consistent with all future site work, including the ongoing ground water investigations. In addition, it is believed that the remedy will reduce overall costs of cleanup actions needed at this site.

The pilot study will provide information to more accurately determine the cost of an SVE system for the recovery and treatment of volatile chemicals and further information regarding the feasibility of removal of EDB from the upper 30 feet of soils at the FAR-MAR-CO subsite.

1,1,1-trichloroethane (TCA) was found in surface soils at the southern boundary of the Farmland Industries property. This chemical is not classified as a carcinogen. As a part of the risk assessment, analytical data were reviewed for noncarcinogenic health effects.

Noncarcinogenic risks are determined by comparing potential doses of contaminants received by site visitors to contaminant specific reference doses. The reference dose is an estimate of an exposure level that would not be expected to cause adverse effects when exposure occurs.

This analysis shows an insignificant health risk from direct contact to the TCA-contaminated soils; however, cleanup action may be warranted to protect ground water. The TCA spill area is

small and is located about 200 feet from the EDB spill. The TCA contamination is not being addressed in this Record of Decision since the most cost-effective cleanup action has not been determined.

EVALUATION OF ALTERNATIVES

Remedial alternatives for the FAR-MAR-CO subsite have been developed in order to meet the objectives of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA); and the NCP, 40 CFR Section 300.68. The process used to evaluate alternatives for this subsite is discussed in the EE/CA and is addressed briefly here.

The first step in the evaluation of alternatives was to investigate technologies and determine which technologies may be both feasible and suitable for the FAR-MAR-CO subsite. The technologies were screened, based on technical feasibility, subsite conditions, environmental/public health protectiveness and regulatory requirements. Table 4 lists the technologies that were considered in the screening process and whether or not the technologies were considered for further evaluation.

Based on this initial screening, response action alternatives were identified for development and evaluation of their ability to meet environmental laws and standards. The viable alternatives were then developed to permit relative cost comparisons of the technically feasible alternatives. The results of this evaluation were that four response alternatives were identified in addition to the NO ACTION alternative.

Section 121(d) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions comply with applicable or relevant and appropriate requirements or standards (ARARs) under Federal and State environmental laws. EPA's findings with regard to protectiveness are shown in Table 5. Also shown in this table is the ability of the five source control alternatives to meet major regulatory requirements.

Delay of the source control implementation would increase the total response action costs for this subsite because costs associated with recovery and treatment of the contaminated ground water are significantly higher. The selected remedy will be cost-effective because further contamination of the ground water will be averted. Recovery and treatment of the hazardous substances in the soils and soil-gas incorporates technologies that are proven and easily adapted to the FAR-MAR-Co subsite.

SUMMARY OF ALTERNATIVES

CERCLA, as amended, and the National Contingency Plan require that each alternative developed, including the no-action

TABLE 4

SCREENING OF
POTENTIAL RESPONSE TECHNOLOGIES FOR
CONTAMINATED SOILS
FAR-MAR-CO SUBSITE

Technology	Screening Result: Potentially Applicable	Screening Result: Not Developed
Excavation	X	
Incineration	X	
Flushing (with water)		X
Biodegradation		X
Composting		X
In situ soil vapor extraction	X	
In situ air stripping	X	
In situ stream stripping		X
Thermal processing		X
Capping	X	

TABLE 5

Summary of Alternatives Evaluation for
Source Control Response Actions

Alternative—	Is Response Protective	Ability to Meet Major Statutory & Regulatory Requirements*
No Action	No	No
Soil Vapor Extraction	Yes	Yes
Excavation with Onsite Treatment	Yes	Yes** (Partial)
Excavation with Offsite Treatment	Yes	Yes** (Partial)
Limited Excavation with Treatment Plus Soil Vapor Extraction	Yes	Yes

* The following potential ARARs have been identified and evaluated for remedial alternatives in this Record of Decision. Federal laws are shown with the corresponding State regulations.

- Federal Resource Conservation and Recovery Act
  - State Regulations, Title 128, Title 132
- Federal Safe Drinking Water Act
  - State Regulations, Title 118, Title 178
- Federal Clean Water Act
  - State Regulation, Title 117
- Federal Clean Air Act
  - State Regulation, Title 129

** Sand material below silt-soils would not be treated, therefore, contaminants would remain below depth of excavation.

alternative, must be evaluated with respect to two major criteria -- protection of human health and the environment and compliance with applicable laws and regulations. Seven additional criteria are considered as a means to compare the alternatives. These include:

- Long-term effectiveness
- Reduction of toxicity, mobility or volume
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

Each alternative must be evaluated for the degree of onsite and offsite protection required (and thus to be provided) by the actions involved, as part of the overall effectiveness.

The following summary will focus on significant evaluation criteria as they relate to the alternatives developed for the FAR-MAR-CO subsite.

No-Action Alternative

The Agency has evaluated the no-action alternative for source control. Because hazardous substances are known to exist in the soils above the aquifer, the concept of a no-action alternative is not protective. Moreover, this alternative does not comply with cleanup objectives including protection of the drinking water aquifer for future use.

Monitoring of downgradient water quality would help identify wells to be closed, but would not prevent continued migration and would not assure availability of alternate water supplies to users. Based on downgradient water quality and the high levels of contamination at the FAR-MAR-CO subsite, the no-action alternative would not reduce migration of contaminants and may permit the level of risk to increase due to the amount of contamination in the soils. Regarding other long-term aspects of the no-action alternative, long-term reliability of monitoring would decrease with the passage of time and with distance from the site. There would be no reduction of mobility, toxicity or volume; therefore, no action would create the highest likelihood of future exposure to hazardous substances being released to the environment.

Under the 1986 amendments to CERCLA, should a remedial action result in hazardous substances, pollutants or contaminants remaining at a site, the remedial action taken must be reviewed within five years to evaluate if the actions taken are protective of public health and the environment. Potential remedial action costs would thus be maximized, since all the contaminants present might have to be remediated as a result of this review. Natural

attenuation of contamination is the only process that could reduce such costs, but due to the toxicity and concentrations of the wastes present, this alternative would not be protective.

In Situ Soil Vapor Extraction

This alternative involves treating contaminated soils in-place without excavation. This alternative will provide permanent removal and destruction of contaminants and, thereby, achieve a reduction in mobility, toxicity and volume.

The need for direct action was stressed in public comments submitted to the Agency. This alternative is acceptable to the State of Nebraska and the community.

In a vapor extraction system, VOCs are removed from soil by applying a vacuum and using a conventional industrial blower and standard valving, piping and instrumentation. Vacuum extraction has been used successfully in full-scale operations for removing many types of VOCs in soils ranging from fine-grained silts to coarse-grained sand and gravels. The extracted vapor may have to be treated by a vapor phase activated carbon system if significant air emissions result from implementation of this response alternative. This alternative was retained for cost evaluation.

Excavation and Onsite Incineration

This alternative employs soil remediation and air treatment technologies that have been fully demonstrated to be effective. Incineration following soils excavation will permanently destroy organic compounds present at the FAR-MAR-CO subsite. This alternative would comply with requirements of 1986 amendments to CERCLA to reduce mobility, toxicity or volume. This alternative would require air quality monitoring and other precautions to minimize migration of air-borne contaminants from the subsite. The air that will be emitted from the incinerator stack may be subject to regulations under the Resource Conservation and Recovery Act.

This alternative would address contaminated soils only to the feasible limit of excavation depth. Therefore, additional soil remediation measures would likely be needed to achieve objectives of minimizing further migration of contaminants to the ground water. This alternative was retained for cost evaluation to provide cost comparisons to other response action alternatives.

Excavation and Offsite Incineration

In terms of long-term public health and environmental protection and reliability, this alternative is similar to the alternative described above (involving onsite incineration). Under this alternative, the excavated soil will be transported offsite for incineration treatment at a RCRA-permitted facility,

which will require contingency planning in the event of a highway accident. Air quality monitoring and other precautions may also be required during soil excavation to minimize migration of air borne contaminants from the subsite.

Implementation of this alternative for treatment of all contaminated soils may not be cost-effective, but it could be used in combination with another alternative (such as vapor extraction) by excavating localized areas of high contamination and incinerating this soil offsite. This alternative was retained for cost evaluation to provide cost comparisons to other response action alternatives.

Combination of Excavation and Incineration with In Situ Soil Vapor Extraction and Treatment

This alternative involves excavating localized areas where high concentrations of volatiles are present in soils and subsequently incinerating these soils onsite. The remaining soils would be treated by in situ vapor extraction (SVE), and the VOC air emissions treated by vapor phase carbon adsorption if emissions exceed state air emission regulations or result in significant increased risk to human health. The air that would be emitted from the incinerator stack may be subject to regulations under the Resource Conservation and Recovery Act, and the EPA would review the emissions control equipment to assure that air emissions do not have an adverse effect on public health.

This alternative may be appropriate due to the fact that the highest levels of contamination are found in the upper 30 feet of the soils. Within the upper 30 feet of soil, the most contaminated section is the upper 5 feet.

Limited excavation is considered feasible for implementation at the FAR-MAR-CO subsite. Under this alternative, the depth of excavation would be determined by analysis of site specific factors and would likely be between 5 and 25 feet.

Unit costs (i.e., estimated cost per yard of soil) were determined to provide cost comparisons to other response action alternatives. An estimate for total capital costs of this alternative has been prepared. The EDB-contamination zone extending to a depth of 5 feet consists of approximately 150 cubic yards of soil. The volume of EDB contaminated soil corresponding to a depth of 30 feet is 400 yards. The estimated costs associated with excavation and onsite thermal treatment of 400 cubic yards of soil is $520,000. Therefore, the maximum total capital costs for this alternative could be as much as $520,000 plus $1,044,000 = $1,564,000.

Cost comparison data are shown by Table 6. These estimates were prepared based upon engineering judgments regarding implementability of the alternatives evaluated for abatement of direct contact threats and source control at the FAR-MAR-CO subsite.

SELECTED ALTERNATIVE

Based on available data and analysis conducted to date, the U.S. EPA selected soil vapor extraction as the most appropriate solution for meeting the goals of the source control operable unit at the FAR-MAR-CO subsite. The characteristics of the selected remedy that are considered most important are:

- The alternative provides protection to human health and the environment from the potential threats associated with no action.
- The alternative limits migration of contaminants to the aquifer at the site.
- The alternative provides for compliance with applicable laws and regulations.
- The alternative is consistent with additional site actions and will be compatible with the final site remedy.

The Regional Administrator retains the authority to make changes in the scope and nature of source control actions to be undertaken at this site. If new information or additional environmental data warrants a change, then the impacts of the suggested change will be reviewed to determine if any significant departure from the selected alternative does in fact exist. Cost impact of any proposed changes will be taken into account. New information about the subsite could alter the cost estimates shown in Table 6.

Selection of the in situ vapor extraction technology is being made at this time; however, a pilot project is planned prior to full-scale implementation of soil vapor extraction. The pilot scale testing for an active gas extraction system will provide the following data:

1. rate of gas withdrawal and air recharge.
2. radius of influence and other information to design the final gas extraction well network.
3. information to design the gas monitoring well network.

Pending successful completion of the pilot, the most cost-effective design will be prepared for the source control remedy.

As a part of the initial action, the PRPs have agreed to construct a fence to restrict access to the EDB spill zone. This temporary measure will minimize potential health risk to employees and other site visitors.

TABLE 6
COST COMPARISON OF RESPONSE ACTION ALTERNATIVES
FOR CONTAMINATED SOILS
FAR-MAR-CO SUBSITE
($ x 1,000)

Alternative	Total (a) Capital Cost	First Year O&M Cost (b)	Unit Cost ($/Cubic Yard)
In situ vapor extraction and treatment (c)	$1,044	$391	75
Excavation and onsite incineration	20,354(d)	-	610
Excavation and offsite incineration	22,116(d)	-	660
Excavation and incineration of hotspots in combination with in situ vapor extraction and treatment	520(e) 600(e) + costs for in situ SVE	-	1,300 (Excavation and onsite incineration) 1,500 (Excavation and offsite incineration)

Notes:
(a) Estimate includes gas extraction system, air treatment system, engineering design, construction management and other contingency costs.

(b) Estimates include power costs, maintenance, labor, monitoring of air and soils and contingency costs.

(c) A total present worth estimate for this alternative has been prepared. The estimated cost is $2,526,000 based on -- a five-year operating period, a 10 percent discount rate and projection of the first year O&M costs over the five-year operating period.

(d) Estimates include all costs associated with site work for an estimated volume of 33,800 cubic yards of soil.

(e) Estimates include all costs associated with site work for excavation and treatment of an estimated volume of 400 cubic yards of soil.

temporary measure will minimize potential health risk to employees and other site visitors.

CLEAN-UP LEVELS

The initial source control operable unit is being implemented for the purpose of controlling contaminant migration, not restoration of the aquifer to drinking water standards. Therefore, no cleanup levels for the SVE process are being established at this time. The vapor extraction system will initially operate under controlled conditions to provide for collection and analysis of operational data. This data will be used to refine final design information and to establish effectiveness of the vapor extraction system. Cleanup effectiveness will be evaluated based on volume of contaminants recovered from the soils. In addition to soil-gas monitoring, soil sampling will be required to demonstrate effectiveness of the cleanup. Review and decision-making regarding cleanup levels will be closely coordinated with the State of Nebraska.

Air emissions will be monitored to assure concentrations of volatile chemicals which present a public health risk do not occur.

As previously stated, recovery of volatiles by SVE will be less costly than treating large volumes of contaminated ground water at a future date. Therefore, the volume of volatile contaminants recovered will be one measure of success of the selected remedy. Ground water monitoring is expected to show a decreased concentration of contaminated ground water migrating from the site. These monitoring data will be direct measures of success of the selected remedy. The anticipated result is that the duration of any long-term actions will be decreased by this remedy.

The Agency believes that the maximum contaminant levels established under authority of the Safe Drinking Water Act are relevant and appropriate for ground water remedies. However, this initial operable unit does not provide for treatment of ground water at the FAR-MAR-CO subsite. Section 121 of CERCLA, as amended, does provide for waiver of the requirement to attain MCLs where an interim remedy is to be selected. Air emissions will be monitored to assure no significant air emissions will be created by this remedy.

OPERATION AND MAINTENANCE

The recommended alternative requires a certain degree of annual operation and maintenance (O&M) activity to ensure proper operation of the system and compliance with environmental laws and regulations. The costs of O&M will depend on volume of contaminants recovered and the size of the completed vapor extraction system. An O&M plan will be developed during remedial

design after the initial phase of operation and testing of the system.

A ground water monitoring plan will also need to be developed and implemented to demonstrate reduced migration of contaminants in the ground water. This plan will be incorporated into the O&M plan. Farmland Industries and Morrison-Quirk Grain Corporation, the responsible parties, have been requested to assume responsibility for the O&M. The EPA will assist the PRPs during transition.

STATUTORY FINDINGS

The U.S. EPA and the State of Nebraska believe that this remedy will satisfy the statutory requirements for providing protection of human health and the environment, attaining applicable or relevant and appropriate requirements of other environmental statutes, will be cost-effective and will utilize permanent solutions for this operable unit and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

SCHEDULE

The following are the key milestones for implementation of the remedial action in the event that RD/RA negotiations are not successful.

Approve Remedial Action (execute ROD)	September 1988
Initiate Remedial Design	September 1989
Initiate Remedial Action	December 1989
Complete Remedial Design	April 1990

FUTURE ACTION

Ground water monitoring wells located at the site will continue to be sampled and a technical approach for plume management will be developed. Agency decision-making regarding ground water treatment will be discussed with the State of Nebraska prior to preparation of a Record of Decision for ground water treatment.